THE OHIO JOURNAL OF SCIENCE

VOL. XLIV MAY, 1944 No. 3

THE FOREST RESOURCES OF AUGLAIZE COUNTY, OHIO[1]

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This report is based on a county survey which was carried out according to the methods specified by the state-wide Ohio Forest Survey (1), a project designed to provide facts essential to public and semi-public agencies concerned with land-use planning for the improvement of the conditions of land tenure, for the integration of forestry and farm programs, and for the development of a rural works program. To obtain these facts, information has been collected concerning the quantity of timber, the location and size of all woodlands, the forest type and condition class of each, the economic aspects of the woodlands, and woodland management problems.

Briefly, the survey methods are as follows. Tracings are prepared from aerial photographs to show the location, shape, and area of all existing woodlands. A random sample of these woodlands is selected for cruising, the percentage selected varying in accordance with the total number of woodlands. From the total of 1,496 woodlands in Auglaize County, 504 were selected for cruising. The timber inventory is based on a tally of the species and diameter of each tree in a series of mechanically located fourth-acre plots established within the individual woodlands. Intensity of cruise of an individual woodland varies inversely with the acreage of the woodland. Of the 16,001 acres of woodland in Auglaize County, timber on 1,772 acres was tallied, affording a 11.1 per cent cruise. Forest cover type and condition class based on field inspection are determined for all woodlands, both cruised and uncruised. The distribution of reproduction by species and size class is recorded for hundredth-acre plots established in cruised woodlands.

GENERAL DESCRIPTION OF THE COUNTY

Physical Features:

Auglaize County is located in the west central part of Ohio, 19 miles from the Indiana border and 72 miles from the Michigan border. The total area is 397 square miles or 254,080 acres which is divided into 14 townships, only six of which have 36 sections.

The terrain of a large part of the county is gently undulating. Some large areas, however, are nearly level and others hilly. The undulating land is, in general, ground moraine and the hill areas are recessional moraines, three of which occur in the county. The whole region is covered by the Lake Wisconsin Drift which overlies limestone bedrock, the Niagara Limestone in the southern part of the county and the Monroe Limestone in the northern part (5).

[1]Acknowledgments: This survey was conducted in 1940 through the cooperative efforts of a group of organizations, mainly: The Work Projects Administration, The Department of Forestry of the Ohio Agricultural Experiment Station, The Agricultural Conservation Association, The Central States Forest Experiment Station, The Ohio Forestry Association, The Izaak Walton League of America, and numerous wood-using industries throughout Ohio.

Of the soils which have developed from this glacial drift, the Miami silty clay loam is the most important in regard to area and is found mainly on undulating or rolling terrain with fair to good surface drainage. Bellefontaine silt loam occurs on the well-drained areas of the hills. Of the soils which occur on the level to slightly undulating terrain, the Crosby and Brookston silty clay loams are dominant. Two forest humus layer types are predominant in the woodlands of the county, the course mull which occurs mainly in the closed ungrazed forested areas, and the firm mull which occurs in the open grazed farm woods. The depth of these humus layers varies approximately from 2 inches to 12 inches, and is greatest in the poorly drained soils.

Cultural Features:

The most important factors affecting the original vegetation, other than the physical, are directly or indirectly due to the influence of man. Therefore, in order to explain the extent, condition, and type of farm woodlands in the county, the cultural features must be considered. An analysis of the economic data for

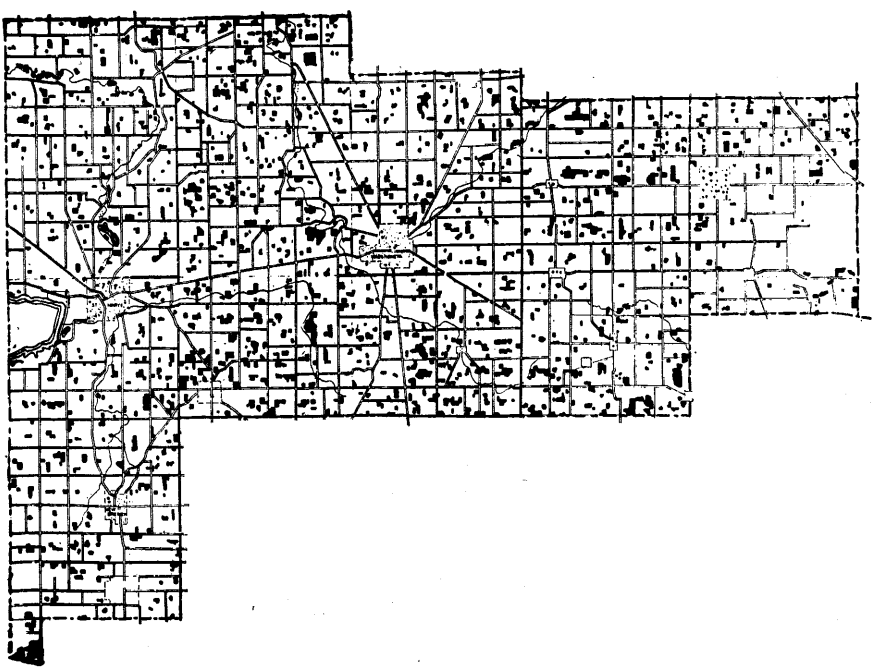


FIG. 1. Forest Cover of Auglaize County, 1940.

Auglaize County indicated that farmwoods are a secondary source of income for the farms of the county because of the adaptability of the land for intensive agriculture, the relatively high land values, and the type of farming. In general, the combination of good soil and good agricultural methods has made the cultivation of crops and the raising of cattle, sheep, and hogs profitable. As a result of the high value of these products and of the land, the farmwoods have become a neglected asset.

FOREST DESCRIPTION

The Original Forest Cover:

In order to fully understand the present forest conditions, it is necessary to have at least a general knowledge of the original vegetation. According to

Transeau and Sampson swamp forests covered most of the county with beech and sugar maple as the dominant species on the well-drained sites. This large area of swamp forest consisted of a number of different phases which are designated by the following types: Willow-Cottonwood-Sycamore, Elm-Ash-Maple, Bur Oak-Swamp White Oak-Hickory, and Red Oak-Basswood. Gordon (2) states that associated with the beech and sugar maple on the better drained sites were Northern red oak, white ash, yellow poplar, white oak, red maple, bitternut hickory, shagbark hickory, buckeye, basswood, blue beech, and hop hornbeam. According to the field notes of the original land survey, beech was apparently a much more important dominant than is indicated by present conditions (Figs. 3 and 4).

Williamson (4) states that "up to 1845 Auglaize County was unsurpassed for its stately trees of many valuable varieties. The splendor of its flora was displayed in its oaks, black walnut, butternut, poplar, hickory, ash, wild cherry, linden, tulip tree, with almost endless varieties of trees of minor value." After 1832 a part of this forest was cleared for agricultural purposes, especially during the period from 1845 to 1856.

The Woodlands of the Present Day:

The forest lands of the county are now, with few exceptions, small farm woodlands. There are 1,496 of these woodlands which make up a total area of 16,001 acres, or 6.3 per cent of the total area of the county. The individual woodlands vary considerably in size; the smallest considered in the survey was 3 acres and the largest was 122 acres. There are very few large woods, however, the average woodland for the county being only 10.9 acres in area. In general the woodlands are quite evenly distributed throughout the county except in the flat prairie land where there is a relatively small number per unit area.

Condition Classes: Each of the farm woodlands in the county has been classified according to the character of its stocking. The unit of this classification is the condition class which is important because a knowledge of woodland structure is essential for a complete understanding of the management problems, the economic values, and the ecological aspects of the forest types. The eight condition classes are illustrated pictorially and the descriptive characteristics of each as designated in the survey are given:

Class I—All-aged Stand (Plate I).
- (a) The trees are well distributed from the reproduction to the medium or large timber size classes.
- (b) The crown canopy is closed or nearly so.
- (c) The deposit of leaf litter is good to excellent.
- (d) There is little or no evidence of grazing.

Class II—Transition Stand (Plate I).
- (a) Trees in the reproduction class are sparse or lacking.
- (b) The crown canopy is 75 per cent or less.
- (c) The woodland is, or until very recently has been, grazed.
- (d) Grass and weeds are becoming established in the openings.
- (e) The deposit of leaf litter is poor.

Class III—Open-park Stand (Plate II).
- (a) Trees in the reproduction class are sparse to lacking, and there are few trees in the pole size class; trees in the small timber class and above are normally distributed, or approximately so.
- (b) The crown canopy is less than 75 per cent.
- (c) There are at least 25 trees per acre.
- (d) The stand has been intensively grazed over a long period of years.
- (e) There is sod present.

I. The presence of all diameter classes from reproduction upward is the outstanding characteristic of Class I woodlands.

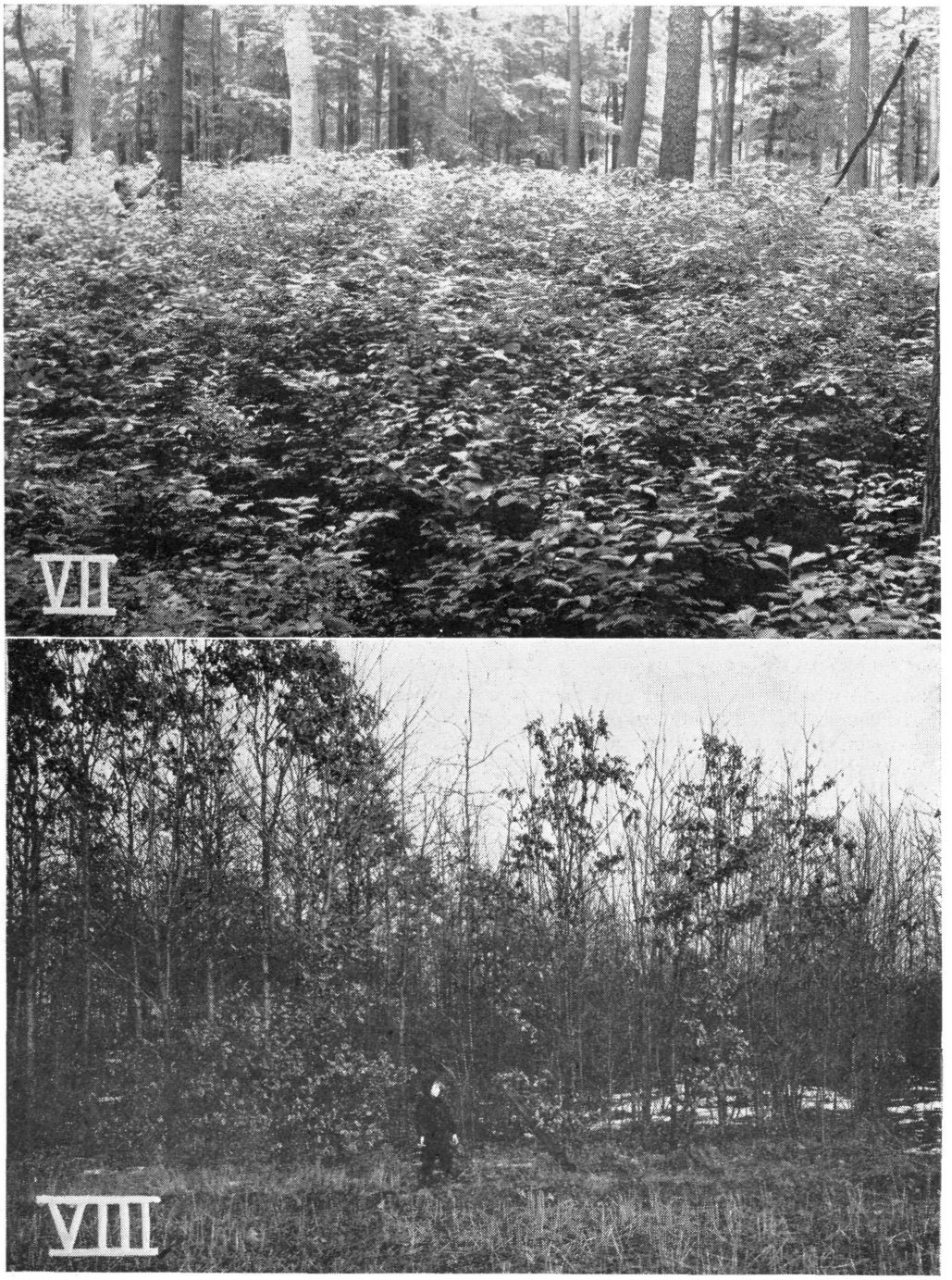
II. The almost total absence of trees of reproduction size, but an otherwise good distribution of size classes, characterizes Class II stands.

III. Features which distinguish Class III woodlands are: the open condition of the stands, the presence of sod on the forest floor, and the preponderance of trees in the larger diameter classes.

IV. Well-stocked stands made up almost exclusively of pole-size trees are called Class IV.

V. Poorly stocked pole stands are called Class V. Grass sod is usually present in the openings.

VI. Pole stands with from 6 to 18 larger trees per acre in the overstory are characteristic Class VI woodlands.



VII. Definite two-storied forests caused by the absence of one or more diameter classes of pole size are called Class VII.

VIII. Trees of reproduction size, originating either from clear-cut stands or volunteer growth on abandoned fields, are mapped as Class VIII.

Class IV—Well-stocked Pole Stand (Plate II).

(a) The trees are mainly in the size classes below the small timber class, i.e., less than 13.0 inches d.b.h. The number of trees in the small timber class and over does not exceed 6 stems per acre.
(b) The crown canopy covers 60 per cent or more of the area.

Class V—Scattered Pole Stand (Plate III).

(a) Resembles Class IV, but is not as heavily stocked.
(b) The crown canopy is less than 60 per cent.
(c) Patches of sod are usually present.

Class VI—Pole Stand with Scattered Large Trees (Plate III).

(a) The trees in the pole and reproduction classes approximate the number of those found in Class I stands.
(b) The number of trees in the small timber class and over is between 6 and 18 per acre.

Class VII—Two-storied Stand (Plate IV).

(a) A stand in which the trees are well-distributed throughout the size classes with the exception of the pole size class which is scarce or lacking.
(b) The over-story has at least 20 trees per acre, and there is a total of at least 25 trees per acre 3.0 inches d.b.h. and over.

Class VIII—Reproduction Stand (Plate IV).

(a) The ground area is at least 25 per cent covered by well-distributed tree reproduction which is 3 feet or more in height.

The Class I woodlands are of special interest because they are the only remaining stands which are stocked and have a composition similar to the original forests. However, this class covers only 867 acres, or 5.4 per cent of the total woodland acreage (Plate I) and therefore cannot be considered of major economic importance. Nevertheless a knowledge of the make-up of these stands is valuable for formulating management plans. The data presented in the stand and stock table (Table I) show very clearly the balanced character of the stand. The total basal area for the average acre is 79.4 square feet for this class. Basal area is the term used to designate the area in square feet of the cross section of a tree 4½ feet above the ground. It may be applied to a single tree or it may be the combined area of the trees on some given area, usually one acre. In this discussion it is on a per acre basis. In comparison with the other classes, this figure is somewhat greater, but due to the fact that in many cases the largest trees have been removed by selective cuttings from Class I stands, it is lower than that which would have been characteristic of virgin stands. In areas in which many of the large trees have been preserved, the total basal area averages slightly more than 100 square feet per acre, the largest recorded being 118.8 square feet. The reproduction is generally abundant and of good quality; the number of stems, which averages 934 per acre, is considerably greater than for any of the other classes.

Condition Class II is much more important in the county than Class I because the woodlands in this classification make up approximately 25 per cent of the total woodland acreage of the county. In form, as shown by the number of stems and basal area of the typical acre (Table I), the stands are not greatly different than those in the Class I condition; however, the average number of stems in the reproduction size class is about two-thirds less.

The Class III woodlands represent advanced stages of forest stand decadence. The data for the average acre of the class indicate the lack of trees below 13

inches in diameter. However, the distribution in the larger size groups is very similar to that of the first two condition classes. There is only a small amount of reproduction in these woodlands which in many cases consists entirely of inferior species; the average of 300 stems per acre of which a large percentage are small seedlings is the lowest number for all of the condition classes. Approximately 17 per cent of the total woodland acreage is in this class, and therefore it is an important part of the forest area.

Class IV and V woodlands generally result from the growth of sprouts and advance reproduction after the clear-cutting of a stand, or from the natural regeneration on abandoned farmland. In regard to the number of trees per acre, these stands are almost as dense as those in the Class I condition, but the basal area is less than half. Both of these classes together comprise only 11 per cent of the total forest acreage, and generally the stands are small in size.

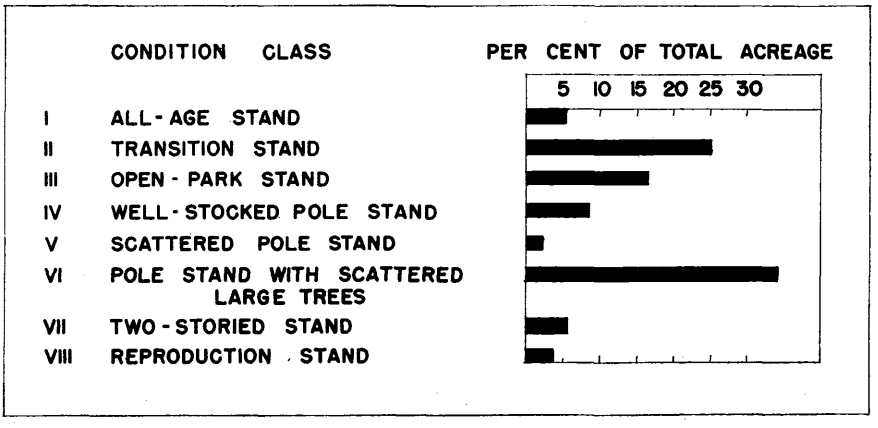


FIG. 2. Distribution of woodland acreage by condition class.

Class VI woodlands are the most typical of the county. The largest number of stands and also the greatest acreage are in this class. Woodlands in this condition occupy 34.1 per cent of the total woodland area, or 5,449 acres. This form of stand generally results from severe cuttings in which all but a few of the larger cull trees are removed. Due to the small number of trees above the pole size, the basal area is relatively low, although the total number of stems in this class approximates the number of those found in Class I stands. Although approximately 75 per cent of the stands are grazed, it is generally light so that reproduction is quite abundant; the typical acre of a Class VI woodland has an average of 751 stems in the reproduction size class.

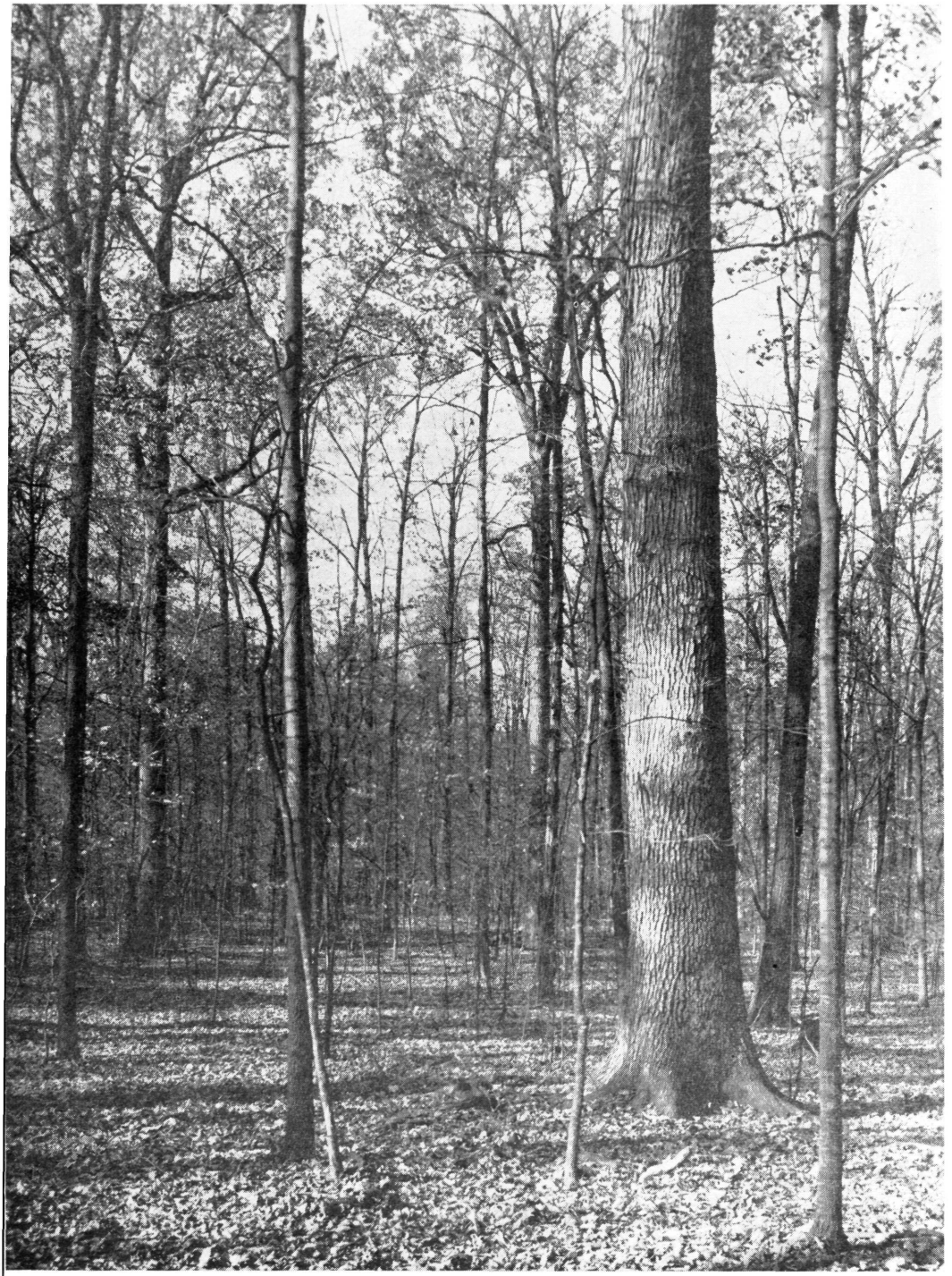
Class VII is relatively unimportant in regard to area covered since it comprises only 5.1 per cent of the total woodland acreage. The elimination of grazing from old Class II or III stands and subsequent establishment of reproduction may result in a two-storied woodland.

Class VIII woodlands are found on clear-cut forest land or on abandoned farmland. Since most of the cleared land is readily adaptable and valuable for farming, only 3.4 per cent of the total woodland acreage has reverted to this condition.

TABLE I

STAND AND STOCK TABLE BY CONDITION CLASS—TYPICAL ACRE

DBH	Class I		Class II		Class III		Class IV		Class V		Class VI		Class VII		DBH
	No. Stems	B.A. Sq. Ft.	No. Stems	B.A. Sq. Ft.	No. Stems	B.A. Sq. Ft.	No. Stems	B.A. Sq. Ft.	No. Stems	B.A. Sq. Ft.	No. Stems	B.A. Sq. Ft.	No. Stems	B.A. Sq. Ft.	
4	47.4	4.7	35.4	3.5	7.1	.7	71.6	7.2	39.8	4.0	51.1	5.1	25.9	2.6	4
6	26.9	5.4	21.2	4.2	6.9	1.4	32.6	6.5	22.2	4.4	28.1	5.6	12.5	2.5	6
8	17.0	5.1	14.1	4.2	7.6	2.3	15.1	4.5	14.2	4.3	17.4	5.2	9.6	2.9	8
10	12.3	6.1	10.6	5.3	8.2	4.1	8.4	4.2	10.0	5.0	11.9	5.9	7.5	2.7	10
12	10.7	8.6	9.3	7.4	8.2	6.6	5.2	4.2	7.3	5.8	8.5	6.8	6.9	5.5	12
14	7.5	8.2	7.4	8.1	7.1	7.8	2.7	3.0	4.1	4.5	5.9	6.5	5.5	6.0	14
16	6.3	8.8	5.6	7.8	6.1	8.5	1.2	1.7	2.1	2.9	4.3	6.0	4.4	6.2	16
18	4.8	8.6	4.2	7.6	4.2	7.6	.9	1.6	1.0	1.8	2.9	5.2	3.3	5.9	18
20	3.4	7.5	2.7	5.9	3.0	6.6	.7	1.5	.4	.9	2.1	4.6	2.1	4.6	20
22	2.3	6.0	2.0	5.2	1.8	4.7	.1	.3	.1	.3	1.3	3.4	1.3	3.4	22
24	1.0	3.1	1.0	3.1	1.3	4.0	.1	.3	.1	.3	.7	2.2	.8	2.5	24
26	.8	3.0	.8	3.0	.8	3.0	.1	.4	.1	.4	.4	1.5	.6	2.2	26
28	.5	1.0	.4	1.7	.4	1.7	.1	.4	.1	.4	.2	.8	.2	.8	28
30	.3	1.5	.2	1.0	.2	1.0	.1	.5	.....	.....	.2	1.0	.2	1.0	30
32	.2	1.1	.1	.6	.2	1.1	.....	.....	.....	.....	.1	.6	.2	1.1	32
34	.1	.7	.2	1.5	.2	1.5	.....	.....	.....	.....	.1	.7	.2	1.6	34
Total	141.5	79.4	115.2	70.1	63.3	62.6	138.9	36.3	101.5	35.0	135.2	61.1	81.2	52.5	Total



A Class I white oak-sugar maple woodland in Pusheta Township.

Forest Types: Nine forest types were selected for the purpose of classifying the woodlands as to species composition. A cover type in this survey is defined and named by the dominants which comprise 50 per cent or more of the crown cover, or, if there are no dominant species, by the general composition of the stand. Each woodland is designated by one cover type.

The Mixed Hardwood Type: This type is the most extensive in the county, although only slightly more so than the Oak-Hickory type. It occupies 21.4 per cent of the total woodland area, or 3,432 acres (Fig. 3), and is therefore of considerable importance. Many of the better woodlands of the county are of this type, since 37 per cent of the total acreage of the type is in Classes I and II. However, there is also approximately an equal acreage in Class VI.

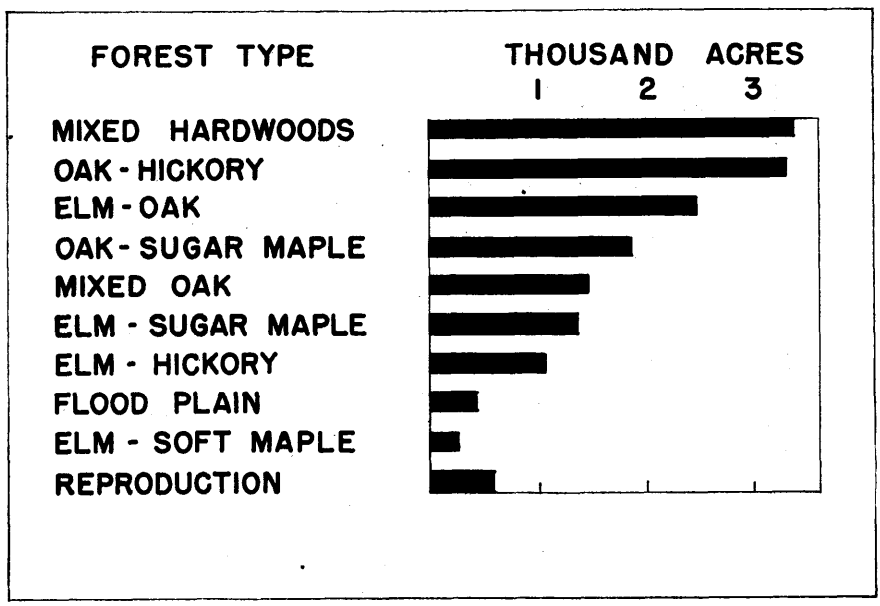


FIG. 3. Distribution of woods acreage by forest type.

As the type name indicates, it is composed of a mixture of hardwoods in which there is no one or small group of species which dominate the stand. The American elm is the most important tree in regard to total basal area and number of stems. It is generally a scattered component and is distributed throughout the various size classes. Of the remaining species which make up the type, hickory, white ash, sugar maple, basswood, beech, and red oak are the most prevalent. In individual woodlands, however, various other species of the total of 48 which were reported for the type may also be important.

Most of the major type species are well represented in the reproduction. American elm is again the most important species with ash and hickory of secondary importance; white and red oak are very sparse. Less desirable small tree species such as *Crataegus*, blue beech, and hop hornbeam, are quite abundant.

Approximately one-half of the woodlands of this type are well-drained and the remaining half partially or poorly drained. The individual woodlands generally occur on undulating or slightly rolling topography and may therefore be composed of a number of type phases. Various phases of the swamp forest such as elm-ash-

maple, bur oak-swamp white oak-hickory, and red oak-basswood probably covered most of these sites originally. Beech, no doubt, was also an important component as shown by the original land survey data (Fig. 4).

Oak-Hickory Type: Second in importance from the standpoint of acreage covered is the Oak-Hickory type, which has a general distribution throughout the county. The economic value, however, is relatively small because of the large proportion of pole size elm and hickory and the poor form of the larger trees. Most of the stands have been quite heavily cut and grazed. Approximately 46 per cent of the total acreage of the type is about equally divided between Classes II and III, and 35 per cent is in Class VI.

There are two sub-types of the Oak-Hickory type. One occurs on well- or moderately well-drained sites and the other on poorly drained habitats. The former

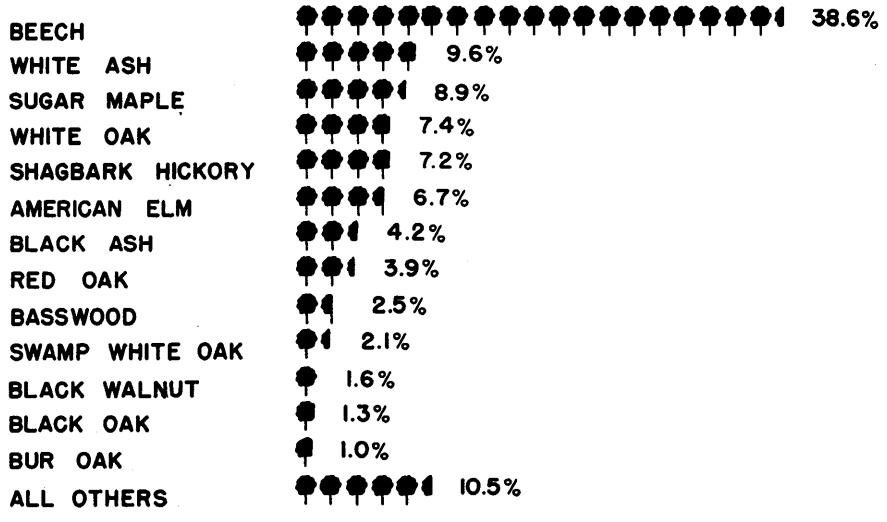


FIG. 4. Percentage composition of the number of stems in the samples of the original vegetation. From notes on the Original County Land Survey.

is the most important since only about one-seventh of the woodlands of this type are poorly drained. Hickory, white oak, American elm, red oak, miscellaneous hickory,[2] and white ash are the important components on the well-drained lands. On the poorly drained sites, hickory, American elm, swamp white oak, chinquapin oak, pin oak, bur oak, soft maple, and black ash are the dominant constituents. Hickory and American elm are the most important species in the reproduction in both drainage conditions; the oaks are very sparse.

The Oak-Hickory type on the well-drained sites appears to be primarily the result of biotic factors such as cutting, grazing, and drainage in original stands of oak and sugar maple. The poorly drained Oak-Hickory sub-type was probably a transition phase of the original swamp forest.

Elm-Oak Type: The Elm-Oak type is quite similar to the Oak-Hickory type in regard to the percentage distribution of the woodlands in the condition classes. Various species of oaks, American elm, and hickory are the chief dominants.

[2]In this report miscellaneous hickories refer to those other than shagbark and shellbark hickory.

This type, since it includes 15.6 per cent of the total woodland acreage, is a significant part of the forest cover.

The Elm-Oak type occurs more frequently on the poorly drained sites than does the Oak-Hickory type. American elm, red oak, white ash, bur oak, swamp white oak, and hickory are the important components of the average stand. White oak and sugar maple are prominent associate species on the well-drained sites. In the reproduction, American elm, white ash, and hickory are abundant in all condition classes, whereas the lack of oak is very marked.

The Elm-Oak type probably became more important after the cutting and grazing of some of the phases of the original swamp forest. Evidences of such a change occur in Class VI stands in which many of the old cull trees are poorly shaped swamp oaks and the young growth is composed of elm, hickory, and white ash.

Oak-Sugar Maple Type: This type occurs most extensively on the well-drained sites and is found mainly in the central part of the county. Sugar maple, red oak, and white oak are the characteristic dominant species. Of the associate species, American elm, shagbark hickory, white ash, and basswood are the most important. Many of the stands are in excellent condition and are the most valuable woodlands in the county. As in other oak types, however, the oak reproduction is very sparse; American elm, sugar maple, and white ash are the most abundant in this size class.

The Oak-Sugar Maple type was probably a part of the original vegetation. Its former importance is not known, but the range of occurrence may have increased after settlement because of the improved drainage conditions in the swamp forest areas.

Mixed Oak Type: The Mixed Oak woodlands also occur on well-drained sites throughout the county. The type can be further subdivided into two sub-types, one which is limited to the best drained sites and the other to the moderately well-drained habitats. White and sometimes black oak are dominant on the former areas whereas red, bur, swamp white, pin and chinquapin oak are the most abundant on the latter. There are 27 other tree species listed for the type, most of which, however, are of minor importance. The principal associate species are American elm, shagbark hickory, basswood, sugar maple, beech, and white ash. From an economic point of view, this type is particularly important because of the high percentage of valuable species.

The early settlers probably found stands of mixed oak when they first arrived in the county. The original composition has, no doubt, changed since the time of settlement and is still changing as indicated by the small percentage of oak in the pole size class and the lack of this species in the reproduction. American elm, white ash, and hickory are the dominants of the reproduction size class.

Elm-Sugar Maple Type: Three species, sugar maple, American elm, and slippery elm make up approximately 50 per cent of the basal area and the number of stems of the type. These species are also the most abundant in the reproduction. However, from the present indications in the field, it seems possible that many of the stands were originally Beech-Sugar Maple. The severe cutting prevalent in this type may account for the dominance of American elm and slippery elm.

The center of distribution of the Elm-Sugar Maple type within the county is in the recessional moraine area which is generally hilly and well-drained. It is in this area that nearly all of the county's maple syrup is produced.

Elm-Hickory Type: The Elm-Hickory type has developed largely as a result of biotic factors. Of the total acreage, 69 per cent, or 728 acres, is included in Classes IV, V, and VI. No stands of the Elm-Hickory type were found in the Class I condition. Of the total number of stems in the type, 92.2 per cent are

in the pole size class. Approximately 50 per cent of this class is divided equally between hickory and American elm; therefore the economic value of this type is low. Fortunately it covers only 6.6 per cent of the total woodland acreage.

The Elm-Hickory type occurs generally on moderately well-drained sites on which some phases of the swamp forest or the sugar maple types originally existed. After severe cutting in forest stands and on abandoned fields, the lack of oak reproduction and the abundance of elm and hickory reproduction favored the development of the present type of stand.

Flood Plain Type: The characteristic forest vegetation of the flood plain occurs mainly on the alluvial soils of the first bottoms of the Auglaize and St.

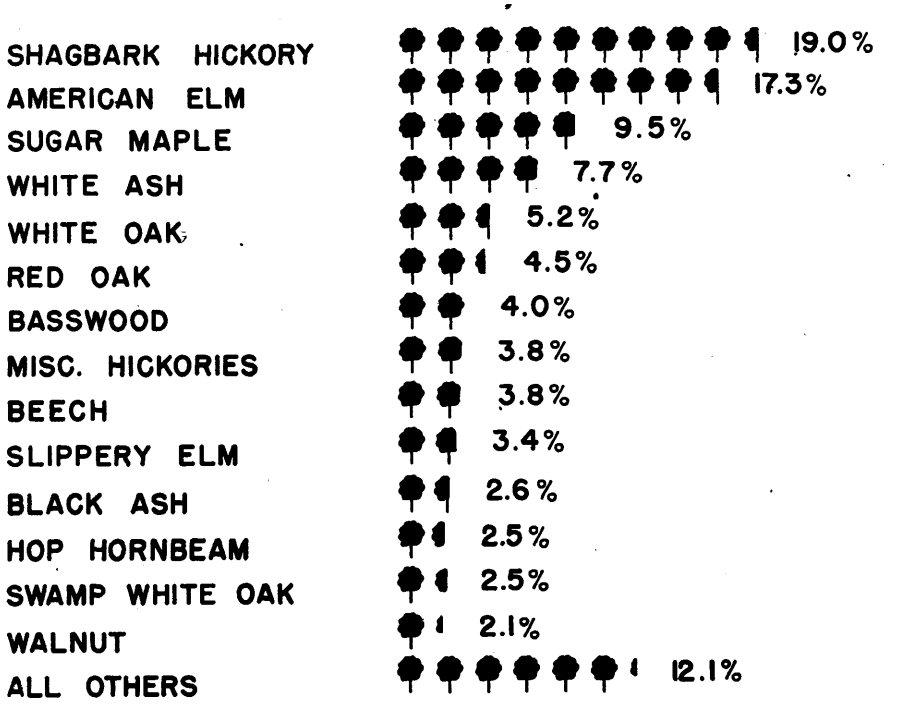


FIG. 5. Percentage composition of the number of stems in the farm woodlands, all types (from survey data).

Marys rivers. This vegetation is influenced by the high water table and, therefore, the type is considered as a phase of the swamp forest. Of the total woodland acreage, 2.1 per cent, or 343 acres, was classified as the Flood Plain type.

The fact that 41.5 per cent of the acreage of the type is in Classes I and II indicates that severe cutting has been less extensive than in any of the other types. Part of the reason for this is the small number of valuable species. American elm is dominant with one-fourth of the total basal area. Other species which make up the mixed stand are: cottonwood, swamp white oak, sycamore, hackberry, honey locust, white ash, willow, and box elder.

There are other phases of the swamp forest on many areas bordering Lake St. Marys which might be considered as variations on the Flood Plain type. Where the water is quite deep throughout the year, cattails are the main vegetation, but towards the edges of the swamps in areas which have only an inch or two of standing

water in the summer, willow is a scattered species. Further back on the better drained areas, cottonwood, American elm, and white ash are the dominants. On those sites which are only periodically flooded, swamp white oak and American elm are the main species which are associated with sycamore, cottonwood, pin oak, and white ash.

Elm-Soft Maple Type: This type covers only 191 acres, or 1.1 per cent of the total woodland area, and includes only a few valuable species. The economic value is therefore small. It is of ecological interest, however, since it occurs mainly on the poorly drained sites and was probably a phase in the original swamp forest. White ash is an important component of the type from the standpoint of the number of stems, but the basal area is relatively small because a large percentage of the trees are in the pole size class. Sycamore, black ash, pin oak, beech, basswood, cottonwood, hickory, and swamp white oak are the most prevalent associate species.

A Summary of the Species Composition of All Types: The species of the oak genus which occur in the county are collectively the most important vegetation of the woodlands from the standpoint of value, volume and percentage of cover. Four of the oaks—red, white, bur, and swamp white—comprise 28.3 per cent of the total basal area of all the types; chinquapin, pin, black, and shingle oak make up a small additional percentage. However, all of the oaks make up only approximately 12 per cent of the total number of stems of all types (Fig. 5) which indicates that there is a relatively high proportion of the trees in the large size classes. The small amount of oak in the reproduction and pole size classes has been noted in all types.

It has been quite apparent from the previous discussion of the types that two of the most important tree species in regard to the total number of stems and basal area are the American elm and shagbark hickory. The sum of their basal areas accounts for 27.7 per cent of the total for all types and is just slightly less than that of the oaks, but in this case the percentage of the number of stems is about three times that of the oaks, or 36.3 per cent of the total number of stems of the county. The number of trees in the small size classes is, therefore, relatively large.

The other species which merit special mention are sugar maple and white ash. Both occur predominately in the pole size class although not to such a marked extent as hickory and elm. Other species which occur extensively throughout the county are basswood, miscellaneous hickory, beech, slippery elm, black ash and walnut.

ECONOMIC ASPECTS OF THE WOODLANDS

Home Consumption of Forest Products:

Accurate data pertaining to the uses and values of the various woodland products are very hard to obtain because the majority of the woodland owners had no written records and were only able to make rough estimates. However, it is possible to designate general trends from the data obtained. The wood products which are used directly on the farm make up the most important part of the income from the farmwoods. Fuelwood is by far the most important product and was noted for almost every woodland for which the information was available. Only a small number of woodland owners in seven townships reported regularly yearly sales of wood or wood products. Many, however, reported occasional sales of saw timber, fuelwood, and posts.

Returns from Woodlands:

In order to improve the neglected farm forestry conditions in the county, considerably more interest in this field must be created. Probably the only way

to create this interest in the majority of cases is to show resulting profits. A good example of a profitable 53-acre woodland, an ungrazed all-aged stand of the Elm-Oak type, was found in Salem Township. A record of the returns is shown in Table II. Under a continuous yield plan of management, the owner has received $175.43 yearly or $3.31 per acre since 1904. Another farmer reported a return of $8.97 per acre over the same period.

TABLE II

RETURNS FROM 53-ACRE WOODLAND

YEAR	ITEM, QUANTITY, AND UNIT VALUE	VALUE RECEIVED (Dollars)
1904	Maple syrup, 10 gal. @ $1.00 per gal	$ 10.00
1905	White oak, 400 trees @ $10 per tree	4,000.00
	Fuelwood sold, 200 cd. @ $1.00 per cd	200.00
1906	Fuelwood sold, 200 cd. @ $1.00 per cd	200.00
1916	White ash	700.00
1918	Fuelwood sold, 40 cd. @ $2.00 per cd	80.00
1920	Ironwood for rollers	5.00
	Oak, 2,500 bd. ft. @ $20 per M bd. ft	50.00
	Fuelwood sold, 50 cd. @ $1.00 per cd	50.00
1923	Oak, 2500 bd. ft. @ $20 per M bd. ft	50.00
1925	Elm and Hickory, 3750 bd. ft. @ $20 per M bd. ft	75.00
1929	Pin Oak, 65 trees @ $2.00 per tree	130.00
1930	Oak and Elm for farm use, 2,000 bd. ft. @ $20 per M bd. ft	40.00
1935	Elm and Red Oak, 1,500 bd. ft. @ $16.50 per M bd. ft	25.00
1939	Ironwood for rollers	6.00
1905 to 1940	Fuelwood for farm, 20 cd. per year @ $1.00 per cd	700.00
	Total income received	$6,321.00

The thirteen woodland owners who reported a yearly production of maple syrup produce 1,067 gallons for an annual return of $1,803. The largest single producer maintains a 50-acre woodland for this purpose only on which 600 trees are tapped each year. The average production is 300 gallons per year, which at $1.50 per gallon yields $450 per year or on a per acre basis $9.00.

Markets and Utilization:

An investigation of the wood-using industries shows that there are markets within the county for all of the more important tree species. In addition it was found that two of the industries are importing high-quality hardwoods from other states or from distant markets in Ohio, namely, white ash, hickory, and sugar maple, which could be grown in properly managed farmwoods within the county.

The wood-using industries are an important part of the economic assets of the

county. There are a total of 24, of which 17 are sawmills. The latter cut an average of 2,400 M bd. ft. per year, most of which is local timber. The other industries which include manufacturers of spokes and wheels, furniture, white ash handles, and wood products for constructional purposes utilize 4,230 M bd. ft., a part of which is imported into the county. For the operation of these industries, 330 persons are employed permanently and 34 part time.

WOODLAND MANAGEMENT

Methods of Cutting:

In the few stands in the county which are somewhat similar to the virgin forests, a selective type of cutting should be made in which only the mature trees are removed. This basic type of cutting should, in practice, be limited by the amount of annual growth so that a sustained yield results. The largest amount of cutting in the near future, however, will necessarily be in the poorer stands. In these cases the object should be to re-establish a well-stocked all-aged stand of valuable trees so that in the future a sustained yield plan may be carried out. The poorly shaped or decayed trees, whether they are mature or immature, should be removed as quickly as they can be utilized for fuelwood or posts to make room for the more valuable species, especially in dense stands. In more open stands, however, care must be taken to maintain a suitable crown cover for the purpose of creating a favorable environment for desirable reproduction.

Grazing:

One of the most important factors which will help to create more productive stands of timber in the county is the elimination of grazing from the farmwoods. It was found that 1,122 woodlands, 75 per cent of the total number, are grazed by cattle, sheep, or hogs. As a result, deterioration of these woodlands is gradually taking place by the elimination of tree reproduction as well as the herbaceous and shrubby layers, the increase of grass sod, the loss of the litter layer, the compacting of the humus layer and the surface mineral soil (Plate VI), the exposure and injury of the roots of certain tree species, and in some instances the mechanical injury to tree trunks.

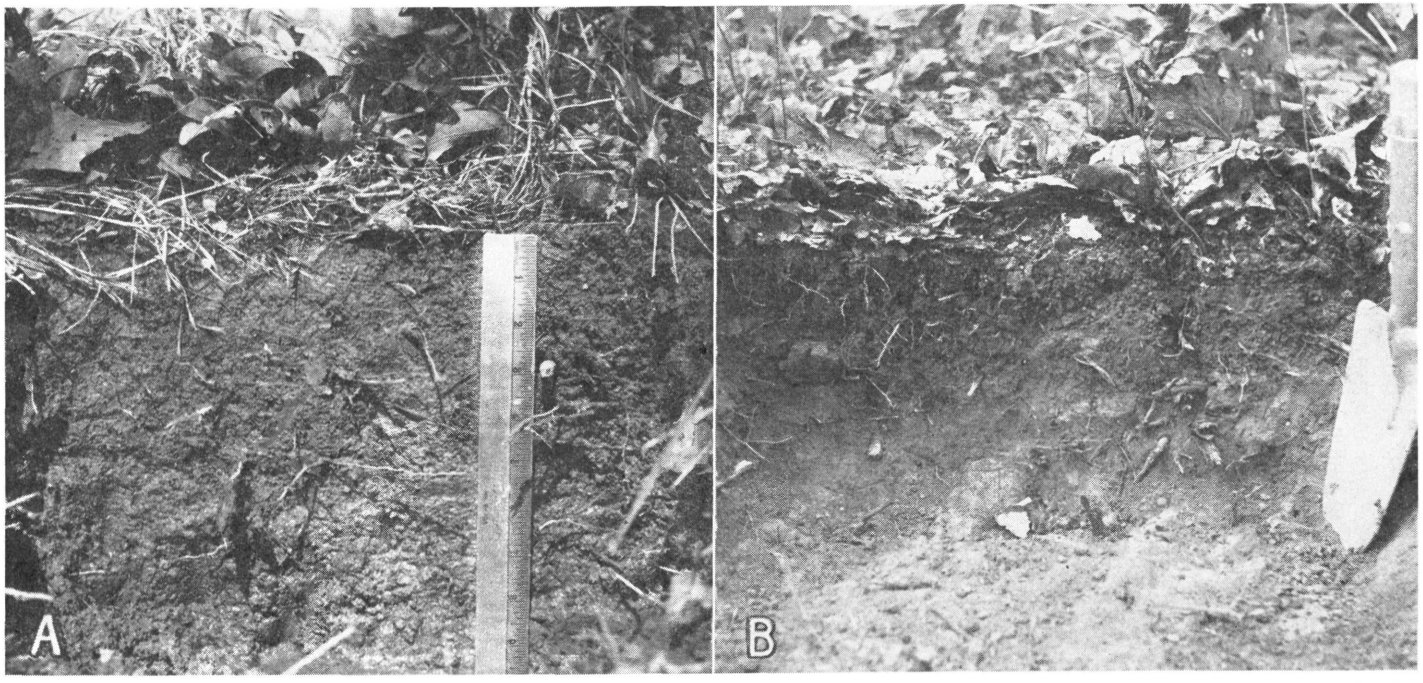
Disease Control:

Rots due to fungi were found important in certain tree species. Every sawyer stated that a heart rot of red oak is very common and destructive. Trunk rots are also very common in beech, and in many cases the top limbs are also partially decayed. In grazed stands the exposed roots of sugar maple and beech are infected very frequently by rots. Losses resulting from these causes can be minimized mainly by the removal of the cull and over-mature trees in the initial cuttings, thus saving only the best trees for the final crop, and also by the elimination of grazing.

SUMMARY AND RECOMMENDATIONS

Auglaize County is mainly an agricultural unit in which the woodlands are of secondary importance in regard to value and land coverage. Originally, however, this region was almost entirely covered with swamp forests. Cutting, grazing, and drainage are the most important factors which have brought about the woodland conditions of today.

Only 6.3 per cent of the total area of the county is now forested. The woodlands, which are usually a section of a farm, are generally small units, the average size of which is 10.9 acres. Of the total woodland area, only 5.4 per cent is comparable to the original stands in composition and structure. Severe cutting characterizes a large number of the woodlands as shown by the fact that 34 per



Effect of Livestock Grazing on Forest Soil.

A—A firm mull, characteristic of heavily grazed open forest stands, the surface horizon of this profile is relatively non-porous, very compact, and difficult to distinguish from the layers beneath. Very few earthworms were found, and the roots were small and very scattered.

B—A coarse mull, characteristic of ungrazed, well-managed woodlands. A loose litter layer overlies the mull which comprises the surface horizon of the profile. It is a dark, porous, granular layer, two to three inches in thickness, with a large earthworm population and an abundance of roots scattered throughout.

cent of the total forested area is composed of young growth with a few scattered large trees, and 17 per cent is open park grazed stands.

For the county as a whole, the oaks as a group are the most important vegetation in the woodlands in regard to value and cover. However, one of the most noticeable observations made in this survey was that there is only a small number of trees of this genus in the reproduction of all types. The important individual tree species according to the total number of stems and total basal area are the American elm and shagbark hickory. Both species are present in all types and are generally dominant in the reproduction. Sugar maple and white ash are valuable species which also occur throughout the county.

The values of the forest products and of the wood-using industries are important economic factors within the county. For the average farm, fuelwood is the most important woodland product; saw timber and posts are of secondary importance.

There is no doubt that it is possible to better the conditions of the farm woodlands and also to increase their productivity and value. In order to accomplish this, the following general recommendations are made:

1. Woodland owners should be shown the value of highly productive stands and the methods of obtaining such stands.
2. The farmers who sell timber should have a knowledge of the methods of estimating volume and the best methods of marking and cutting.
3. The sawmill owners who buy and cut the timber should be fully informed of the value of continuous yields.
4. Grazing of woodlands should be eliminated.

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